

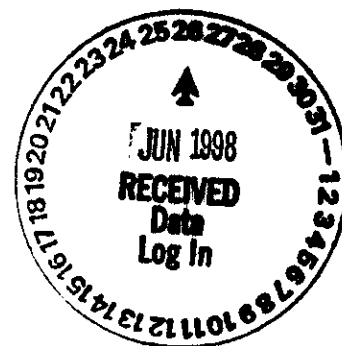
0049537

**CERTIFICATE OF ANALYSIS  
 SDR FOR SAMPLE B0NKH3**

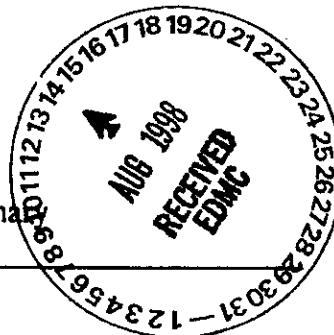
Bechtel Hanford, Inc.  
 3350 George Washington Way  
 Richland, WA 99352

June 26, 1998

Attention: Joan Kessner



SAF Number : B98-068  
 Date First Sample Received : April 14, 1998  
 Number of Samples : One (1)  
 Sample Type : Other-Liquid  
 SDG Number : W02329B  
 Data Deliverable : 15 Day Priority/21 Day Summary



**I. Introduction**

On April 14, 1998, one 15-day TAT "other" sample was received by the Quanterra Environmental Services Richland Laboratory (QESRL) for radiochemical and chemical analysis. An additional request for Total Strontium analysis on a 15 day TAT for this sample was initiated on 6/2/98 by Rich Weiss. This sample was assigned the following laboratory ID number to correspond with the Bechtel Hanford, Inc. (BHI) specific ID:

<u>QESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
80611101	B0NKH3	Other-Liquid	4/14/98

**II. Analytical Results/Methodology**

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

- Gas Proportional Counting**
- Gross Beta by method RICH-RC-5014
- Total Strontium by method RICH-RC-5006

Bechtel Hanford, Inc.

June 26, 1998

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### III. Quality Control

The analytical results for each analysis performed under SDG W02329B include a minimum of one Laboratory Control Sample (LCS), one method (reagent) blank, and one duplicate. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

### IV. Comments

#### Gas Proportional Counting

##### Gross Beta by method RICH-RC-5014

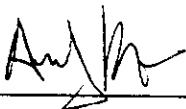
We reanalyzed the sample for Gross Beta to confirm the original result. The LCS, batch blank and sample results are within contractual requirements. The duplicate (B0NKH3) result from the reanalysis was not within the first level evaluation criteria of the contract of 35% RPD but was within the second level evaluation criteria of 70% RPD at 62% RPD. The RPD value for the original analysis and the reanalysis was 59%.

##### Total Strontium by method RICH-RC-5006

The LCS, batch blank and sample results are within contractual requirements. The concentration of the Total Strontium did not account for the activity observed from the Gross Beta analysis. The duplicate (B0NKH3) result from the reanalysis was not within the first or second level evaluation criteria of the contract of 35% and 70% RPD respectively.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Andy Kopriva  
Project Manager

## SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02329B/ 5470  
LAB SAMPLE ID: 80611101 MATRIX: OTHER  
CLIENT ID: B0NKH3 DATE RECEIVED: 6/3/1998 3:00:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
BETA	2.85E+06		3.1E+05	3.8E+05	2.52E+05	pCi/L	100.00%	RICHRC5014-E
STRONTIUM	5.47E+04	U	6.8E+04	7.1E+04	2.20E+05	pCi/L	95.60%	RICHRC5006

Number of Results:

**Quanterra Data Review Checklist  
RADIOCHEMISTRY**

Work Order number (s): <u>806111</u>				
Client ID: <u>BHI</u>				
Due Date: <u>6-18-98</u> <u>B</u>				
Lab Sample Number or SDG: <u>W92329-A</u> <u>6/25/98</u>				
Method Test Parameters: <u>Bite</u> <u>AB</u>				
Matrix: <u>Other</u>				
Review Item	Yes (✓)	No (✓)	NA (✓)	FL Level Review (✓)
<b>A. Calibration</b>				
1. Is the calibration documentation included where applicable?		<u>ATK</u>		
<b>B. Sample Analysis</b>				
1. Are the sample yields within acceptance criteria?				
2. Were all sample holding times met?				
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	<u>ATK</u>		<u>Activity &gt; MDL</u>	
<b>C. QC Samples</b>				
1. Is the blank yield within acceptance criteria?				
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	<u>✓</u>			<u>✓</u>
3. Is the blank result < 1/2 the Contract Detection Limit?	<u>✓</u>			<u>✓</u>
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?				
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?				
6. Is the LCS result within acceptance criteria?	<u>✓</u>			<u>✓</u>
7. Is the LCS yield within acceptance criteria?				
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?	<u>✓</u>			<u>✓</u>
9. MS/MSD results and yield meet acceptance criteria?				
10. Duplicate sample results and yield meet acceptance criteria?			<u>NCM</u>	<u>✓</u>
<b>D. Other</b>				
1. Are all Nonconformances included and noted?	<u>1 NCM</u>			<u>✓</u>
2. Are all required forms filed out?	<u>✓</u>			<u>✓</u>
3. Correct methodology used?	<u>✓</u>			<u>✓</u>
4. Transcription checked?	<u>Im 6-11-98</u>	<u>✓</u>		
5. Were all calculations checked at a minimum frequency?	<u>✓</u>			
6. Units checked?	<u>✓</u>			<u>✓</u>

Comments on any "No" response: \_\_\_\_\_

First Level Review: \_\_\_\_\_

Date: 6-12-98

Second Level Review: \_\_\_\_\_

Date: 6/18/98

Form #: LS-038.2/96, Rev 4

# QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

PAGE 1 OF 2

LOG #: RD-98

Project ID: <u>BHI</u>	NCM Initiated by: <u>JK 6-12-98</u>
Sample Numbers: <u>806 11101, 806 11101</u>	
Tests: <u>Beta, Septal NCG-12-98</u>	
Matrix: <u>Other (liquid)</u>	<u>W02329B</u>

**Analytical Area (check appropriate area):**

<input type="checkbox"/> Sample control	<input type="checkbox"/> GC	<input type="checkbox"/> Wet chemistry	<input checked="" type="checkbox"/> Data review
<input type="checkbox"/> Organic preparation	<input type="checkbox"/> HPLC	<input type="checkbox"/> Metals	<input checked="" type="checkbox"/> Radiochemistry
<input type="checkbox"/> Inorganic preparation	<input type="checkbox"/> GC/MS	<input type="checkbox"/> Reporting	<input type="checkbox"/> Bioassay

**Nonconformance (check appropriate area):**

<p><b>Holding Time Violations (exceeded by _____ days)</b></p> <p><i>Category I: Laboratory Independent</i></p> <p><input type="checkbox"/> 1. Holding time expired in transit</p> <p><input type="checkbox"/> 2. Sample received &gt; 48 hrs. or 1/2 holding time has expired</p> <p><input type="checkbox"/> 3. Test added by client after expiration</p> <p><i>Category II: Laboratory Dependent</i></p> <p><input type="checkbox"/> 4. Instrument failure</p> <p><input type="checkbox"/> 5. Analyst error</p> <p><input type="checkbox"/> 6. Login error</p> <p><input type="checkbox"/> 7. Miscommunication</p> <p><input type="checkbox"/> 8. Other (complete description required)</p> <p><i>Category III: Analysis Reruns (QA/QC)</i></p> <p><input type="checkbox"/> 9. Surrogates</p> <p><input type="checkbox"/> 10. Internal Standards</p> <p><input type="checkbox"/> 11. Spike Recoveries</p> <p><input type="checkbox"/> 12. Blank Contamination</p> <p><i>Category IV: Analysis Reruns (Confirmation)</i></p> <p><input type="checkbox"/> 13. Second column</p> <p><input type="checkbox"/> 14. Contamination check</p> <p><input type="checkbox"/> 15. Confirmation of matrix effects</p> <p><input type="checkbox"/> 16. Other (complete description required)</p>	<p><b>Quality Assurance/Quality Control</b></p> <p><input type="checkbox"/> 17. QC data reported outside of controls</p> <p><input type="checkbox"/> 18. Incorrect procedure used</p> <p><input type="checkbox"/> 19. SOP intentionally modified with QA and Tech. approval</p> <p><input type="checkbox"/> 20. Invalid instrument calibration</p> <p><input type="checkbox"/> 21. Insufficient sample received for proper analysis</p> <p><b>Incorrect or Incomplete Client Deliverable</b></p> <p><input type="checkbox"/> 22. Hardcopy deliverable error</p> <p><input type="checkbox"/> 23. Electronic deliverable error</p> <p><b>Reported detection limits elevated due to:</b></p> <p><input type="checkbox"/> 24. Sample matrix</p> <p><input type="checkbox"/> 25. Insufficient sample volume</p> <p><input type="checkbox"/> 26. Other (complete description required)</p> <p><input checked="" type="checkbox"/> 27. Other (specify): <u>Sample + duplicate</u> <u>do not agree</u></p> <p>Comments/Explanation: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
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**Notification (check appropriate area):**

<p>Client notified by (name and date): _____</p> <p><input checked="" type="checkbox"/> in writing <u>CN</u>      <input type="checkbox"/> by facsimile</p> <p><input type="checkbox"/> by telephone      <input type="checkbox"/> other (explain)</p>	<p>Client's name and response: _____</p> <p><input type="checkbox"/> process "as is"      <input type="checkbox"/> re-sample</p> <p><input type="checkbox"/> on hold until _____      <input type="checkbox"/> other (explain)</p>
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Project Manager (signature and date): [Signature] 6/18/98

0009

# QUANTERRA LABORATORY NONCONFORMANCE MEMO (NCM)

PAGE 2 OF 2

LOG#: RD-98-\_\_\_\_\_

## Corrective Action

Root Cause

Initial and date:

non-homo geneous sample suspected JK6-12-98

Corrective Action

Initial and Date:

Data given to pm for final disposition with client. JK6-12-98

Responsibility for performing CA assigned to: \_\_\_\_\_

Actions to prevent recurrence

Initial and Date: \_\_\_\_\_

First Level Supervisor:

Date:

John Kempma

6-12-98

Responsible Manager:

Date:

Jacqueline Waddell

6/20/98

## Quality Assurance Review

☒ Anomaly

☐ Deficiency

☐ Rerun

☐ Further action required: \_\_\_\_\_

Assigned to: \_\_\_\_\_

QA signature:

C Black

Date:

6-26-98

## Corrective Action Verification

☐ Verified

☐ Cannot Verify (specify reason):

NA 6-26-98

## Nonconformance Memo Closure

QA signature/date:

C Black

6-26-98

0010

**Quanterra Data Review Checklist  
RADIOCHEMISTRY**

Work Order number (s): <u>806111</u>				
Client ID: <u>BHE</u>				
Due Date: <u>6-18-98</u> <u>B</u>				
Lab Sample Number or SDG: <u>W02329A</u>				
Method Test Parameters: <u>Total Sr</u>				
Metric: <u>Other</u>				
Review Item	Yes (✓)	No (✓)	N/A (✓)	2 <sup>nd</sup> Level Review (✓)
<b>A. Calibration</b>				
1. Is the calibration documentation included where applicable?			✓	
<b>B. Sample Analysis</b>				
1. Are the sample yields within acceptance criteria?	✓			✓
2. Were all sample holding times met?	✓			✓
3. Is the sample Minimum Detectable Activity < the Contract Detection Limit?		✓		
<b>C. QC Samples</b>				
1. Is the blank yield within acceptance criteria?	✓			✓
2. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?		✓		
3. Is the blank result < 1/2 the Contract Detection Limit? <u>OK &lt; MDA</u>		✓		
4. Is the blank > 1/2 the Contract Detection Limit but < Contract Detection Limit?			✓	
5. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓	
6. Is the LCS result within acceptance criteria?	✓			✓
7. Is the LCS yield within acceptance criteria?	✓			✓
8. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?		✓		
9. MS/MSD results and yield meet acceptance criteria?			✓	
10. Duplicate sample results and yield meet acceptance criteria?	✓			✓
<b>D. Other</b>				
1. Are all Nonconformances included and noted?			✓	
2. Are all required forms filed out?	✓			✓
3. Correct methodology used?	✓			✓
4. Transcription checked? <u>Jun 6-15-98</u>	✓			
5. Were all calculations checked at a minimum frequency?	✓			
6. Units checked?	✓			✓

Comments on any "No" response: Discuss MDA + Non-detects w/ Andy, contact  
Rehull OK to accept.

First Level Review: [Signature]

Date: 6-18-98

Second Level Review: [Signature]

Date: 6/18/98

Form #: LS-038.2 /96, Rev.4

0011

# CHAIN OF CUSTODY FORMS



Bechtel Hanford Inc.		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				B98-068-05		Page 1 of 1	
Collector <i>Doug Bryant</i>		Company Contact <i>DAVE ENCK</i>		Telephone No.		Project Coordinator TRENT, SJ		<b>Data Turnaround 15 Days</b>	
Project Designation 233-S Plutonium Concentration Facility Process Areas - Ot		Sampling Location <i>233-S</i>				SAF No. B98-068			
Ice Chest No. <i>SML-286</i>		Field Logbook No.				Method of Shipment <i>Gov Vehicle</i>			
Shipped To Quanterra Incorporated		Offsite Property No. <i>N/A</i>				Bill of Lading/Air Bill No. <i>N/A</i>			
Waste Designation      Client determined no waste codes associated with this project.						COA			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b>     <b>Special Handling and/or Storage</b>	<b>Preservation</b>	None	None	None	None						
	<b>Type of Container</b>	<i>GP</i>	<i>GP</i>	<i>GP</i>	<i>GP</i>						
	<b>No. of Container(s)</b>	<i>250</i>	<i>1</i>	<i>250</i>	<i>250</i>						
	<b>Volume</b>	200ml	200ml	200ml	1000ml						

<div style="display: flex; justify-content: space-between;"> <span style="font-size: 1.2em;">80611101</span> <span>SMA</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>80423801 TH 6/15/98</span> <span>W02329A</span> </div>	Americium-241/Curium-244	Gross Alpha, Gross Beta	Isotopic Plutonium	See item (1) in Special Instructions							
--	--------------------------	-------------------------	--------------------	--------------------------------------	--	--	--	--	--	--	--

Sample No.	Matrix *	Sample Date	Sample Time								
BONKH3	Other Liquid	4-14-98	1040	X	X	X	X				

<b>CHAIN OF POSSESSION</b>	<b>Sign/Print Names</b>				<b>SPECIAL INSTRUCTIONS</b> (1) Gamma Spectroscopy (Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226) <i>All of Sample Volume in one container. Sample Volume ≈ 25 mL.</i> <i>Per instruction from Rick Allen on 6/2/98 log in for Gross Beta &amp; Tot Sr on 6/3/98, 15 day TAT</i>				<b>Matrix *</b> S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other
Relinquished By <i>Doug Bryant</i>	Date/Time <i>4-14-98</i>	Received By <i>Kenneth Blum</i>	Date/Time <i>4-14-98</i>						
Relinquished By <i>[Signature]</i>	Date/Time	Received By <i>[Signature]</i>	Date/Time						
Relinquished By	Date/Time	Received By	Date/Time						
Relinquished By	Date/Time	Received By	Date/Time						

LABORATORY SECTION	Received By	Title
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By

*4/5/98*

<b>1. SHIP FROM U.S. DEPT. OF ENERGY C/O</b> Company <u>BHI Hanford</u> Address <u>233-S, West AEA</u> City, State, Zip <u>Richland, WA 99352</u> Contact <u>Darin ST John / Doug Bryant</u> Phone <u>509-376-8540 / 509-376-8273</u>					<b>RADIOACTIVE SHIPMENT RECORD</b>		<b>1009153</b> Page / of 2																																								
<b>2. SHIP TO</b> Company <u>Quantura</u> Address <u>2800 Gen Wash Way</u> City, State, Zip <u>Richland, WA 99352</u> Attention <u>KAREN Astenberg</u> Phone <u>509-375-3131 EXT 135</u>					<b>Ship</b> <input checked="" type="checkbox"/> Prepaid <input type="checkbox"/> Collect		<b>Via</b> <input checked="" type="checkbox"/> Motor <input type="checkbox"/> Air Psgr <input type="checkbox"/> UPS <input type="checkbox"/> Rail <input type="checkbox"/> Air Cargo <input type="checkbox"/> Site Carrier																																								
<b>5. HM Proper Shipping Name:</b> _____ <b>Radioactive Material:</b> _____ <input type="checkbox"/> excepted package - empty packaging 7 UN2910 <input type="checkbox"/> excepted package - instruments or articles 7 UN2910 <input checked="" type="checkbox"/> excepted package - limited quantity of material 7 UN2910 <input type="checkbox"/> excepted package - articles manufactured from natural or depleted uranium or natural thorium 7 UN2910 <input type="checkbox"/> Special Form, n.o.s. 7 UN2974 <input type="checkbox"/> Low Specific Activity, n.o.s. 7 UN2912 <input type="checkbox"/> n.o.s. 7 UN2982 <input type="checkbox"/> Fissile, n.o.s. 7 UN2918 <input type="checkbox"/> Surface Contaminated Object 7 UN2913					<b>Markings Applied</b> 8. <input checked="" type="checkbox"/> Radioactive - LSA <input checked="" type="checkbox"/> Radioactive - SCO <input type="checkbox"/> Type A <input type="checkbox"/> Type B with trefoil <b>LSA Description</b> 8. <input checked="" type="checkbox"/> LSA-I <input type="checkbox"/> LSA-II <input type="checkbox"/> LSA-III <input type="checkbox"/> SCO-I <input type="checkbox"/> SCO-II <b>Labels Applied</b> 10. <input checked="" type="checkbox"/> Empty <input checked="" type="checkbox"/> Radioactive White - I <input checked="" type="checkbox"/> Radioactive Yellow - II <input checked="" type="checkbox"/> Radioactive Yellow - III <input type="checkbox"/> Subsidiary Hazard		<b>For Normal Form only</b> 7. Identify Physical Form <input checked="" type="checkbox"/> Liquid <input type="checkbox"/> Gas <input type="checkbox"/> Solid Chemical Form <input checked="" type="checkbox"/> Elemental <input type="checkbox"/> Metal <input type="checkbox"/> Nitrate <input type="checkbox"/> Oxide <input type="checkbox"/> Mixture <input type="checkbox"/> Other																																								
<b>EMERGENCY RESPONSE</b> 9. Telephone <u>509-373-3800</u> Emergency Response Guide(s) <u>161</u>					Highway Route Controlled Quantity <input type="checkbox"/> Exclusive Use Shipment with instructions <input type="checkbox"/> Placards Applied <input type="checkbox"/> If Rail Specify: _____ Fissile Excepted, Grams <u>&lt; 5gm</u> <input checked="" type="checkbox"/> Excepted Package Statement <input checked="" type="checkbox"/>																																										
Warning - Fissile Material Controlled Shipment. Do Not Load More Than <u>N/A</u> Packages Per Vehicle. In Loading and Storage Areas, Keep at Least 20 Feet From Other Packages Bearing Radioactive Labels.																																															
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>11.</th> <th>No. Pkg.</th> <th>Model Package</th> <th>COC/Spec</th> <th>Serial No.</th> <th>Seal No.</th> <th>Isotopes</th> <th>T.I.</th> <th>Bq/Package</th> <th>Gr. Wt. Kg.</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>StrongTight</td> <td>N/A</td> <td>N/A</td> <td>TAPE</td> <td>PU-239/240, Am241</td> <td>N/A</td> <td>5.22 x 10<sup>6</sup></td> <td>21 kg</td> </tr> <tr> <td colspan="9">           Sample Number: <u>BONK43</u>            Shipped in Poly Cooler Packer w/ wet ICE         </td> </tr> <tr> <td colspan="7" style="text-align: right;">TOTALS</td> <td>N/A</td> <td>5.22 x 10<sup>6</sup></td> <td>21 kg</td> </tr> </tbody> </table>									11.	No. Pkg.	Model Package	COC/Spec	Serial No.	Seal No.	Isotopes	T.I.	Bq/Package	Gr. Wt. Kg.		1	StrongTight	N/A	N/A	TAPE	PU-239/240, Am241	N/A	5.22 x 10 <sup>6</sup>	21 kg	Sample Number: <u>BONK43</u> Shipped in Poly Cooler Packer w/ wet ICE									TOTALS							N/A	5.22 x 10 <sup>6</sup>	21 kg
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TOTALS							N/A	5.22 x 10 <sup>6</sup>	21 kg																																						
(Shipper may describe package in detail on one of the unused lines above)																																															
<b>12.</b> This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. Certifier's Signature <u>Darin St John</u> On behalf of DOE-RL Date <u>04/13/98</u> Organization <u>ERC - AFS</u> Complete Cost Code (Inc. End Function) <u>22358 SAF 398-068</u>																																															
<b>13.</b> Surface Dose Rate of Package <input checked="" type="checkbox"/> < 0.005 or _____ mSv/hr Dose Rate @ 1 Meter from Surface of Package <input checked="" type="checkbox"/> < 0.005 or _____ mSv/hr Smears of Outer Container <input type="checkbox"/> < 0.41 Bq (22 dpm) & 1 /cm <sup>2</sup> <input type="checkbox"/> < 0.04 Bq (2.2 dpm) & 1 /cm <sup>2</sup> <input checked="" type="checkbox"/> < Tbl. 2-2 HSRM Onsite Limits TRUCK LOAD OR EXCLUSIVE USE Surface <input checked="" type="checkbox"/> < 2 mSv/hr (200 mrem/hr) @ 2 meters <input checked="" type="checkbox"/> < 0.1 mSv/hr (10 mrem/hr) @ Cab <input checked="" type="checkbox"/> < 0.02 mSv/hr (2 mrem/hr) (Using N+3 Y)																																															
Additional Data and Instructions (inc. Readings on Internal Packaging) Signature - Radiation Monitoring <u>Darin</u> Bldg. <u>233S</u> Survey No. <u>2335-78-045</u> Date <u>4/14/98</u>																																															
<b>14.</b> <b>TRANSPORTER</b> Vehicle Number <u>663-23803</u> DRIVER SIGNATURE <u>Darin Bryant</u> <b>RECEIVER</b> RECEIVER SIGNATURE <u>Darin St John</u> Date <u>4-14-98</u>																																															
<b>15.</b> <b>OFFSITE AUTHORIZATION</b> Shipment has been inspected and verified to be in compliance with DOT regulations Authorized Signature <u>M.A. Sams</u> Printed Name <u>M.A. SAMS</u> Date <u>4-14-98</u>																																															
<b>16.</b> <b>AUTHORIZATION FOR SHIPMENT</b> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="2"> <b>AIR TRANSPORT CERTIFICATION</b>  <input type="checkbox"/> N/A         </td> <td> <b>CARGO AIRCRAFT</b>  <input type="checkbox"/> Cargo Aircraft Only Labels Applied         </td> <td> <b>PASSENGER AIRCRAFT</b>  <input type="checkbox"/> Ltd Qty  <input type="checkbox"/> &lt; 3 T.I.         </td> <td> <input type="checkbox"/> Research/Medical Diagnosis  <input type="checkbox"/> Human Medical Research         </td> <td> <b>Pkg. Dimensions (cm)</b>  <u>N/A</u> </td> </tr> <tr> <td colspan="4"></td> </tr> </table>									<b>AIR TRANSPORT CERTIFICATION</b> <input type="checkbox"/> N/A	<b>CARGO AIRCRAFT</b> <input type="checkbox"/> Cargo Aircraft Only Labels Applied	<b>PASSENGER AIRCRAFT</b> <input type="checkbox"/> Ltd Qty <input type="checkbox"/> < 3 T.I.	<input type="checkbox"/> Research/Medical Diagnosis <input type="checkbox"/> Human Medical Research	<b>Pkg. Dimensions (cm)</b> <u>N/A</u>																																		
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<b>17.</b> <b>OFFSITE AUTHORIZATION</b> Tracking No. <u>RM BH 2408</u> Date Shipped <u>4-14-98</u> Routing <u>CH2M</u> ETA <u>4-14-98</u> Surveyed By <u>N/A</u> Date <u>N/A</u> Approved for Shipment Offsite <u>M.C. Timm</u> Date <u>4-14-98</u>																																															

For Sample  
BANK 1+3

## GAMMA-RAY ENERGY ANALYSIS REPORT

Thermo Hanford Inc.

Radiological Counting Facility

THI - RCF

Project 233-S  
Customer ID B0NKH2 Solution  
RCF ID RCF3087

Sample time, date 4/8/98

Analysis date 4/8/98

Isotope	Activity pCi/gm	2 s err	CI/gm
K40	< 3.7e+00		3.7e-12
Co60	< 8.1e-01		8.1e-13
1129	< 8.6e+01		8.6e-11
Cs137	< 1.0e+00		1.0e-12
Eu152	< 2.4e+00		2.4e-12
Eu154	< 2.3e+00		2.3e-12
Eu155	< 1.6e+00		1.6e-12
Th232dau	< 2.6e+00		2.6e-12
U235	< 3.7e+00		3.7e-12
U238	< 5.6e+01		5.6e-11
U238dau	< 1.1e+00		1.1e-12
Np237	< 7.8e-01		7.8e-13
Am241	1.2e+04 +/-	3.6e+02	1.2e-08

Tot Act Gam (pCi/gm) 1.2e+04 CI/gm 1.2e-08

Y/Sr-90 &lt; N/R

Gross Alpha 3.0e+04 +/- 3.0e+03 3.0e-08

Gross Beta 3.2e+03 +/- 4.5e+02 3.2e-09 Reported as 137-Cs Betas.

AEA total 3.5e+04 +/- 3.5e+03

Total Activity (pCi/gm) 3.8e+04

239/240-Pu 2.6E+04 (CI/gm) 3.8e-08

241-Am 1.3E+04

## Definitions:

Note: 152-Eu is not a 100% Beta emitter.

All errors reported at 2 standard deviations

A Assigned as residual beta from Gamma/Beta balance.

For soils and natural samples, the following applies:

The analysis of U238 is based on the activity of Pa234m

The analysis of Np237 is based on the activity of Pa233

U238dau is the activity of Pb214 and Bi214, short lived daughter products of U238. Equilibrium between parent and daughter products probably does not exist in disturbed materials.

Th232dau is the activity of Ac228, Pb212, and Tl208, short lived daughter products of 232Th. Equilibrium between parent and daughter products may not exist in disturbed materials.

Other samples, not containing natural materials, may have inapplicable results for the Th, U, transuranics and daughter products. The results must then be balanced for the gross alpha analysis.

N/R means no result or analysis not requested.

J. L. Ruff, G. W. 4-9-98  
Radiological analyst Date

Albert I. Davis 4/9/98  
Radiological Manager Date

Post-It Fax Note	7671	Date	4/9	# of pages	1
To	Deleg. August.	From	Al Davis		
Co./Dept.		Co.			
Phone #	373-6562	Phone #	373-9731		
Fax #	376-8851	Fax #			

Figure 1

## SAMPLE CHECK-IN LIST

Date/Time Received: 4-14-98 1430 SG#: W02329Work Order Number: 804238 SAF #: B98-068Shipping Container ID: SML-76 Chain of Custody #: B98-068-051. Custody Seals on shipping container intact? Yes ☒ No ☐2. Custody Seals dated and signed? Yes ☐ No ☒3. Chain-of-Custody record present? Yes ☐ No ☒4. Cooler temperature 4°C5. Vermiculite/packing materials is Wet ☐ Dry ☒6. Number of samples in shipping container: 17. Sample holding times exceeded? Yes ☐ No ☒

8. Samples have:
- |   |  |
|---|--|
| <input checked="" type="checkbox"/> tape          | <input type="checkbox"/> hazard labels             |
| <input checked="" type="checkbox"/> custody seals | <input type="checkbox"/> appropriate sample labels |

9. Samples are:
- |   |   |
|---|---|
| <input checked="" type="checkbox"/> in good condition | <input type="checkbox"/> leaking          |
| <input type="checkbox"/> broken                       | <input type="checkbox"/> have air bubbles |

10. Where any anomalies identified in sample receipt? Yes ☐ No ☒

11. Description of anomalies (include sample numbers): \_\_\_\_\_

Sample Custodian/Laboratory: Larry Pickering Date: 4-14-98

Telephoned To: \_\_\_\_\_ On \_\_\_\_\_ By \_\_\_\_\_



## CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

5-Jun-1998

Page 1

CUSTOMER: BHI

SAMPLE DELIVERY GROUP

MATRIX : OTHER

BATCH NUMBER

W02329AB

06-111

6/25/98

JB.

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
--------	-----	---------	-------------	----------

1 )	80611101	BHI	BONKH3	
-----	----------	-----	--------	--

Do6 111 01

(80423801)

Job 111 15

Job 111 15

ACTIONS (Initial &amp; Date)

1) INITIATED

SOP(S) #

JH 6/5/98

RD 7800

5) COUNTING/MEASUREMENT LAB

SOP(S) # RICHRC0003

2) PREP LAB RECEIVED Doc 6-9-98

SOP(S) # RICHRC5014-0

6) DATA REVIEWED AND  
ANALYTICAL PREP STORED

SOP(S) #

JX 6-12-98

RICHRC0002

3) SAMPLE REMAINDER STORED 6-9-98 Doc

SOP(S) #

N/A

4) SEPARATION LAB RECEIVED

SOP(S) #

0018

## CHAIN-OF-CUSTODY BATCH ANALYSIS RECORD

5-JUN-1998

Page 1

CUSTOMER: BHI

SAMPLE DELIVERY GROUP

MATRIX : OTHER

BATCH NUMBER

W02329A

06-111

QES ID	DUP	ACCOUNT	CUSTOMER ID	COMMENTS
--------	-----	---------	-------------	----------

1 )	80611101	BHI	BONKH3	
-----	----------	-----	--------	--

(80423801)

J0611115

J0611115

## ACTIONS (Initial &amp; Date)

1) INITIATED

SOP(S) #

JH 6/5/98  
RD 8800

5) COUNTING/MEASUREMENT LAB

SOP(S) #

on 6/13/98  
RICHRC0003  
Rev

2) PREP LAB RECEIVED 6-9-98 on

SOP(S) # RICHRC5016-1

6) DATA REVIEWED AND  
ANALYTICAL PREP STORED

SOP(S) #

MC 6-15-98  
RICHRC0002  
Rev

3) SAMPLE REMAINDER STORED 6-9-98 on

SOP(S) #

JH

4) SEPARATION LAB RECEIVED

SOP(S) #

RTM 6/11/98  
RichRC5006/2